

CLAIMS

1. A process of producing aldehydes in a continuous hydroformylation process of continuously reacting an olefinic unsaturated compound with carbon monoxide and hydrogen in the presence of a rhodium-phosphite based complex catalyst and continuously separating at least one component from a reaction product, the process being characterized in that at least a part of an aldehyde product and water are taken out as a mixed vapor flow from a catalyst-existent region in the process, and at least a part thereof is fed outside the catalyst-existent region as it stands as the vapor or as a condensate after cooling, to reduce the water concentration within the catalyst-existent region.

2. The process of producing aldehydes according to claim 1, wherein the continuous hydroformylation process is a liquid circulation type hydroformylation process in which a reaction product containing at least the rhodium-phosphite based complex catalyst and aldehyde product taken out from a reactor is fed into a catalyst separation step to separate the aldehyde product, followed by circulation into the reactor.

3. A process of producing aldehydes in a liquid circulation type hydroformylation process of taking out a reaction product containing at least a rhodium-phosphite

based complex catalyst and an aldehyde product obtained by continuous hydroformylation reaction of an olefinic unsaturated compound with carbon monoxide and hydrogen in the presence of a rhodium-phosphite based complex catalyst from a reactor and feeding it into a counter-current contact column; subjecting it to counter-current contact with a raw material gas to recover the unreacted olefinic unsaturated compound; and after gas-liquid separation, subjecting a liquid phase to separation and recovery of the aldehyde product in a catalyst separation step and then circulating it as a reaction medium into the reactor, the process being characterized in that at least a part of the aldehyde product and water are taken out as a mixed vapor flow from a catalyst-existent region in the process, and at least a part of the mixed vapor flow is taken out as it stands as the vapor or as a condensate after cooling and then fed into a step outside the catalyst-existent region to reduce the water concentration within the catalyst-existing region.

4. A process of producing aldehydes in a liquid circulation type hydroformylation process of taking out a reaction product containing at least a rhodium-phosphite based complex catalyst and an aldehyde product obtained by continuous hydroformylation reaction of an olefinic unsaturated compound with carbon monoxide and hydrogen in the presence of a rhodium-phosphite based complex catalyst

from a reactor; after gas-liquid separation, subjecting the resulting liquid phase to separation and recovery of the aldehyde product in a catalyst separation step and then circulating it as a reaction medium into the reactor; and bringing the aldehyde product separated in the catalyst separation step into counter-current contact with a raw material gas in a counter-current contact column to recover the unreacted olefinic unsaturated compound, the process being characterized in that at least a part of the aldehyde product and water are taken out as a mixed vapor flow from a catalyst-existent region, and at least a part thereof is fed as it stands as the vapor or as a condensate after cooling into a step outside the catalyst-existent region to reduce the water concentration within the catalyst-existing region.

5. The process of producing aldehydes according to claim 4, wherein at least a part of the mixed vapor flow containing at least a part of the aldehyde product and water taken out from the catalyst-existent region is taken out as it stands as the vapor or as a condensate after cooling and then fed into the counter-current contact column.

6. The process of producing aldehydes according to claim 1, wherein the continuous hydroformylation process is a fixed catalyst type continuous hydroformylation process in which a reaction product containing the aldehyde product,

unreacted olefinic unsaturated compound and by-products taken out from a reactor is fed into a separation step to separate the aldehyde product.

7. The process of producing aldehydes according to claim 6, wherein the amount of the aldehyde contained in the reaction medium and a high-boiling product formed in the reaction process in the reactor is 0.6 or more in terms of a weight ratio of aldehyde/high-boiling product.

8. The process of producing aldehydes according to claim 6 or 7, wherein the continuous hydroformylation process includes a catalyst reactivation step.

9. The process of producing aldehydes according to any one of claims 1 to 8, wherein the olefinic unsaturated compound is reacted with carbon monoxide and hydrogen at a temperature of from 30 °C to 90 °C.

10. The process of producing aldehydes according to any one of claims 1 to 9, wherein at least a part of the aldehyde product and water are taken out as a mixed vapor flow from the reactor and a gas-liquid separator equipped in the reactor, and at least a part thereof is fed as it stands as the vapor or as condensate after cooling outside the catalyst-existent region, thereby reducing the water concentration within the catalyst-existent region.

11. The process of producing aldehydes according to any one of claims 1 to 10, wherein the amount of water contained in the mixed vapor flow to be taken out from the

catalyst-existent region is 30 % or more of the amount of water to be fed into the reactor and water to be formed within the reactor, and at least a part of water contained in the mixed vapor flow is fed outside the catalyst-existent region.

12. The process of producing aldehydes according to any one of claims 1 to 11, wherein the amount of water contained in the mixed vapor flow to be taken out from the catalyst-existent region is 30 % or more of the amount of water to be fed into the reactor and water to be formed within the reactor, and 30 % or more of the amount of water contained in the mixed vapor flow is fed outside the catalyst-existent region.

13. The process of producing aldehydes according to any one of claims 1 to 12, wherein the amount of water to be fed outside the catalyst-existent region is 30 % or more of the amount of water to be fed into the reactor and water to be formed within the reactor.

14. The process of producing aldehydes according to any one of claims 1 to 13, wherein the olefinic unsaturated compound is propylene.